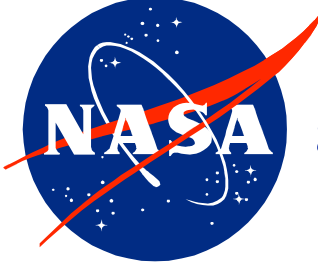


Signals that the Earth sends out –

Opportunity for  and for Ames

Some Ideas and Suggestions for more than one ROSES call

Friedemann T. Freund

SETI Institute, Mountain View

and

Department of Physics

San Jose State University

We've made progress in understanding processes in the Solid Earth that have relevance to more than one ROSES program.

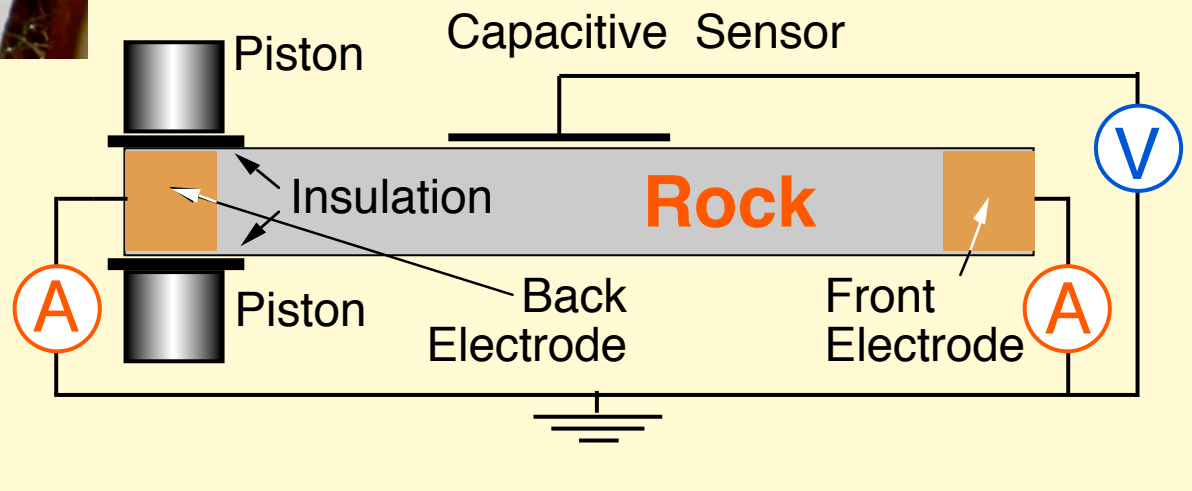
- Rocks, when subjected to tectonic stresses, turn into a battery.
- They produce electric currents in the Earth's crust, millions of amperes strong.
- This discovery can lead to proposals for the following ROSES calls:

- C.4 [Planetary Geology and Geophysics](#)
- C.12 [Mars Fundamental Research](#)
- A.15 [Earth System Science Research using Data and Products from the Terra, Aqua, and ACRIMSAT Satellites](#)
- A.11 [Earth Surface and Interior](#)

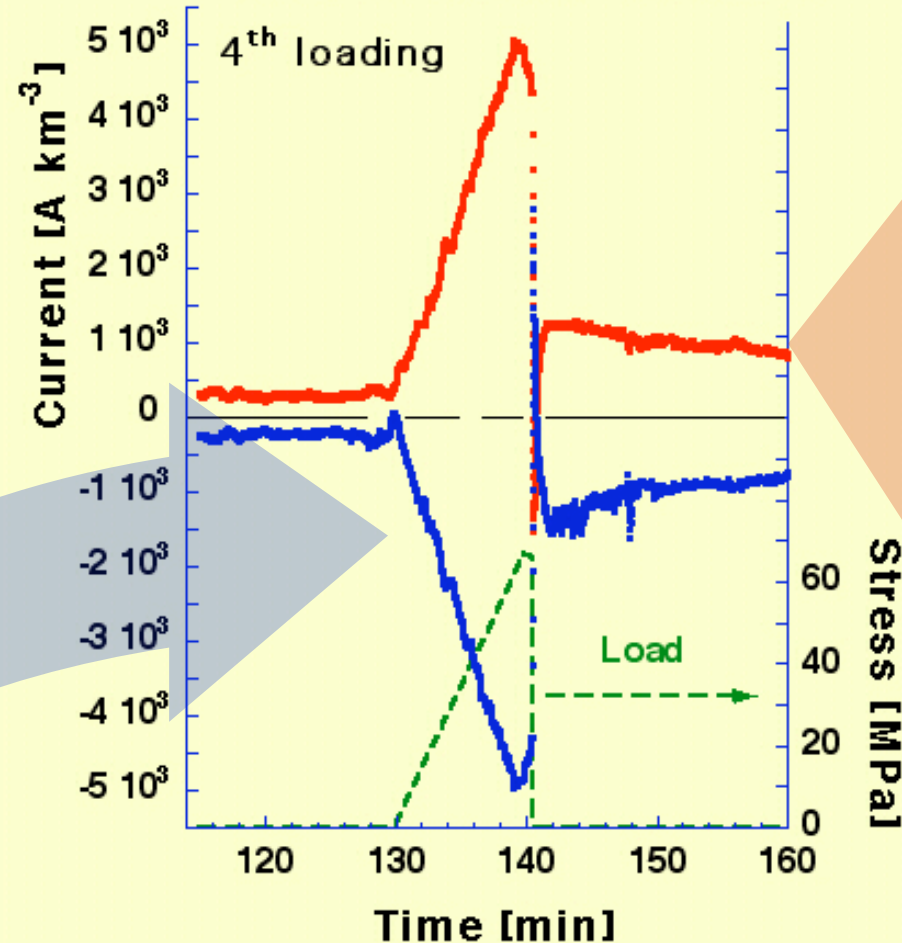


Block of Sierra Nevada granite

1.2 m long
10 x 15 cm² cross section
air-dry
loaded at one end



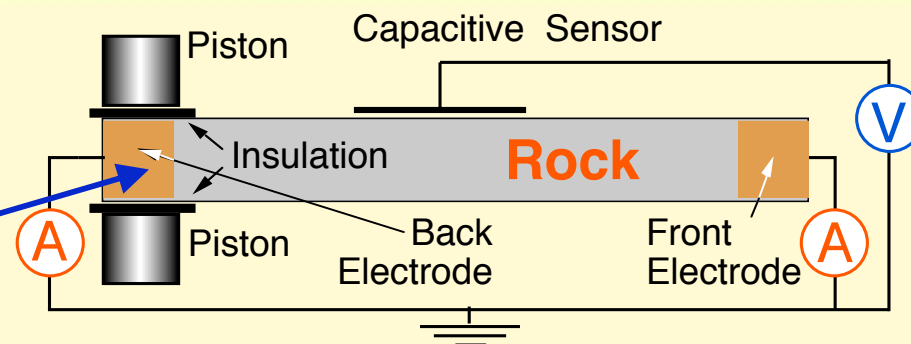
"Sierra White" Granite



Electrons
are flowing
out of the
Source

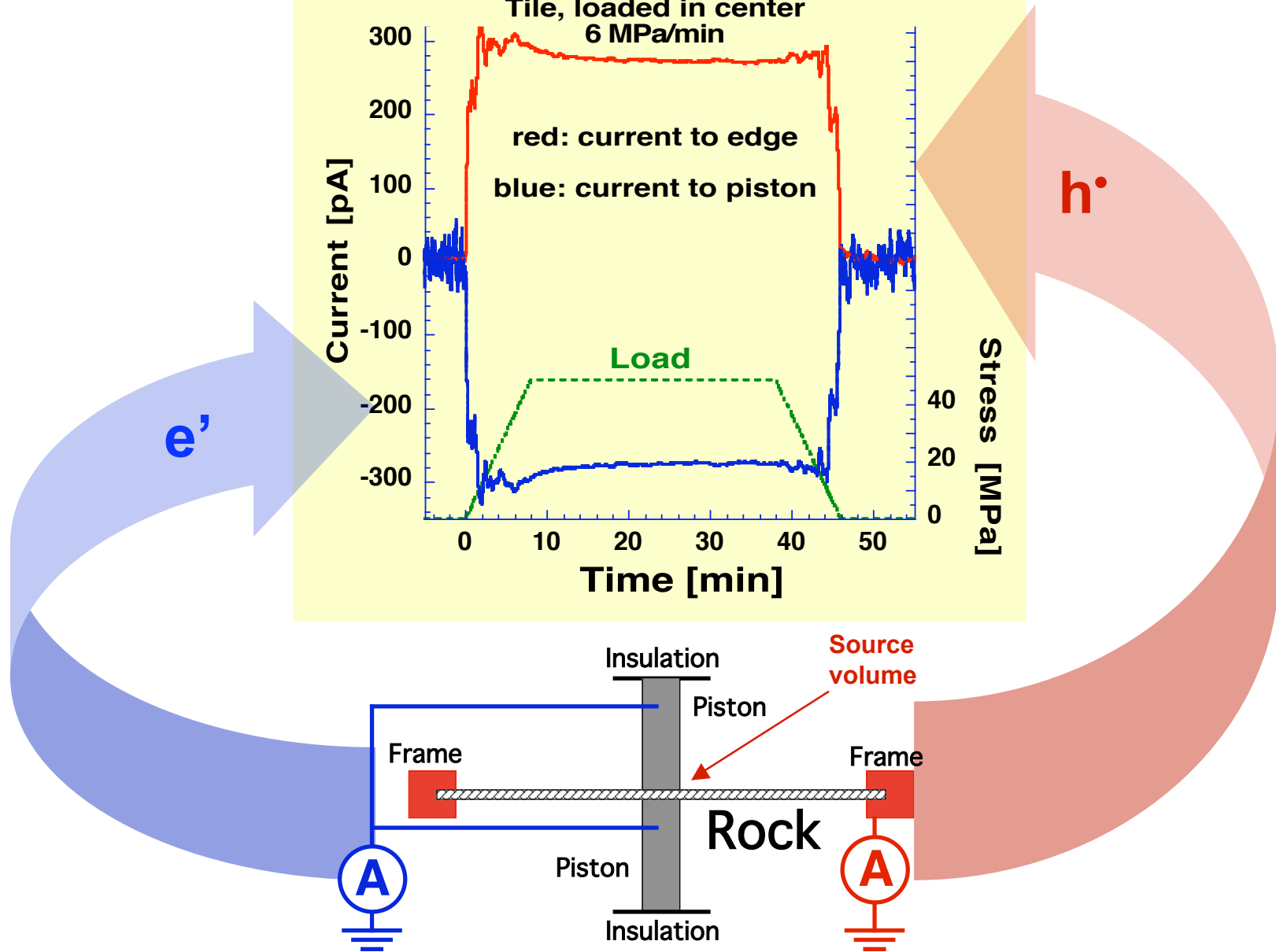
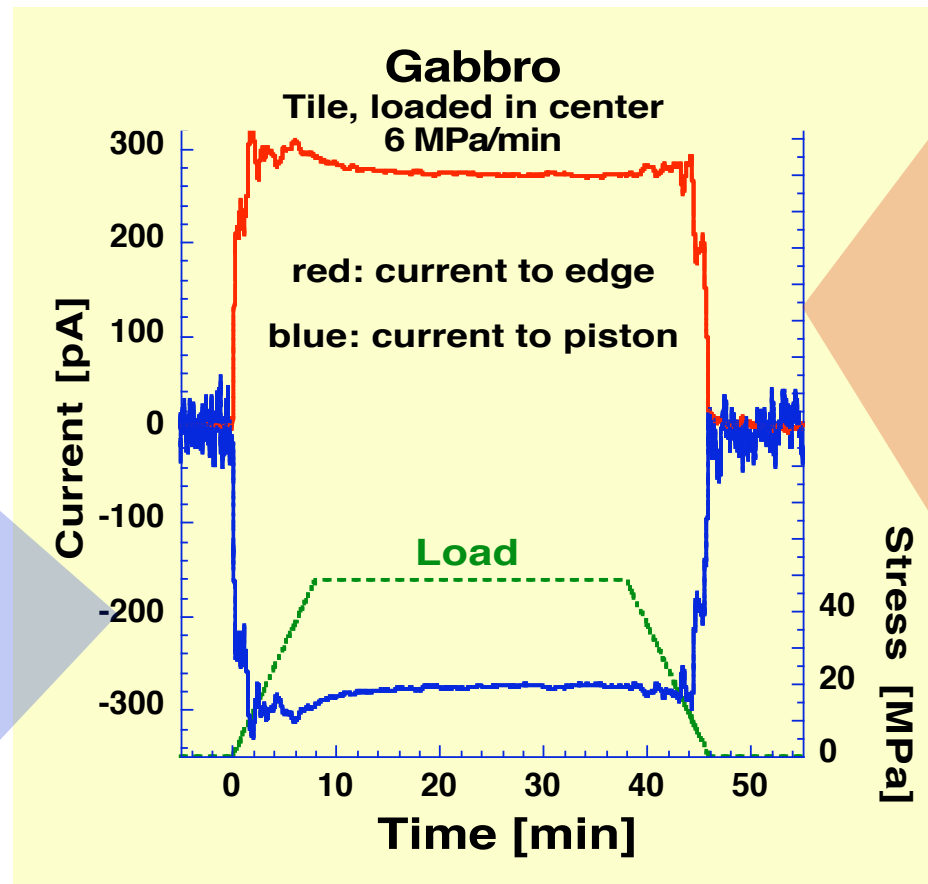
e^-

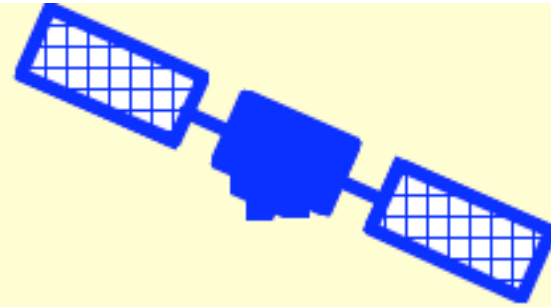
Source



Holes
are flowing
through
the
rock

h^+





Ionosphere
Atmosphere
Earth's Surface

**Mid-IR
Emission**

**Deformation
activates
p-holes.**



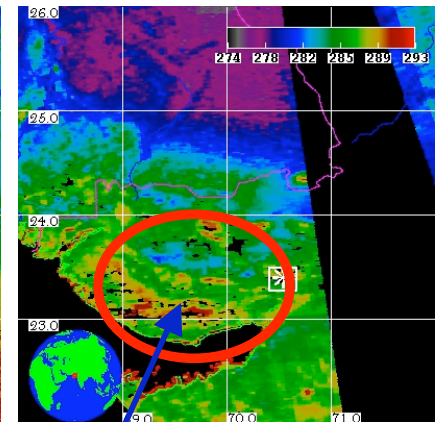
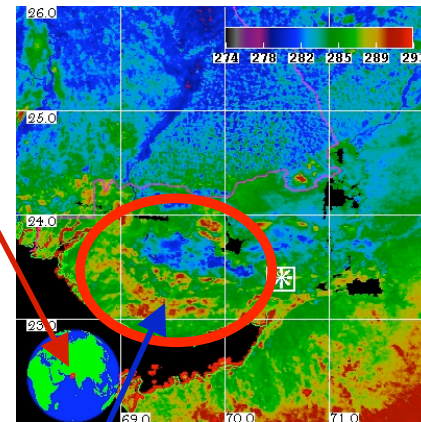
M=7.6 Gujarat earthquake Jan. 26, 2001, northern India

MODIS night-time mid-IR data
(courtesy of Dimitar Ouzounov, GSFC/SSAI)

**Rapid changes of the IR intensity
several days before main shock
outlining the hidden faults**

Jan 18, 2001

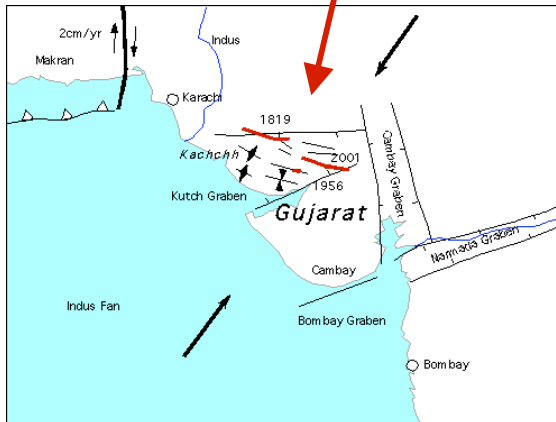
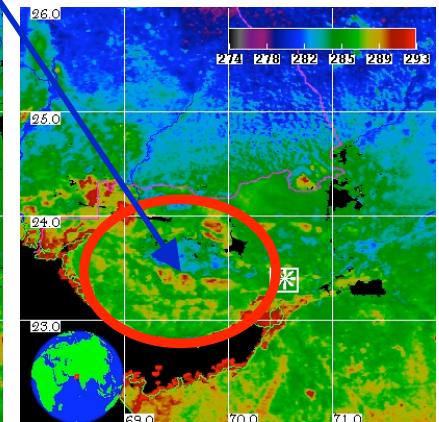
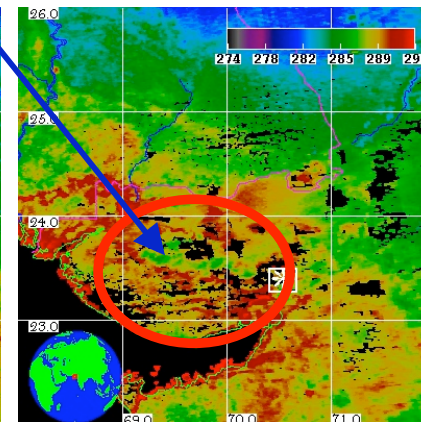
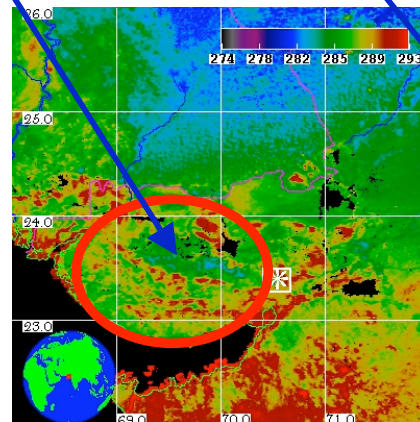
Jan 19, 2001

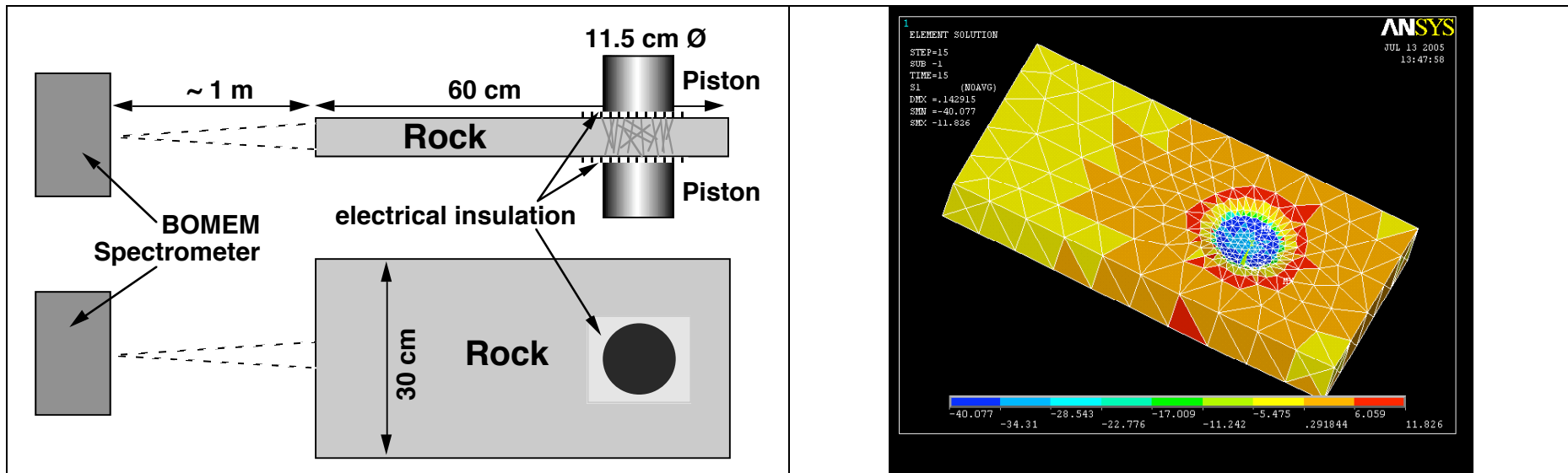


Jan 20, 2001

Jan 21, 2001

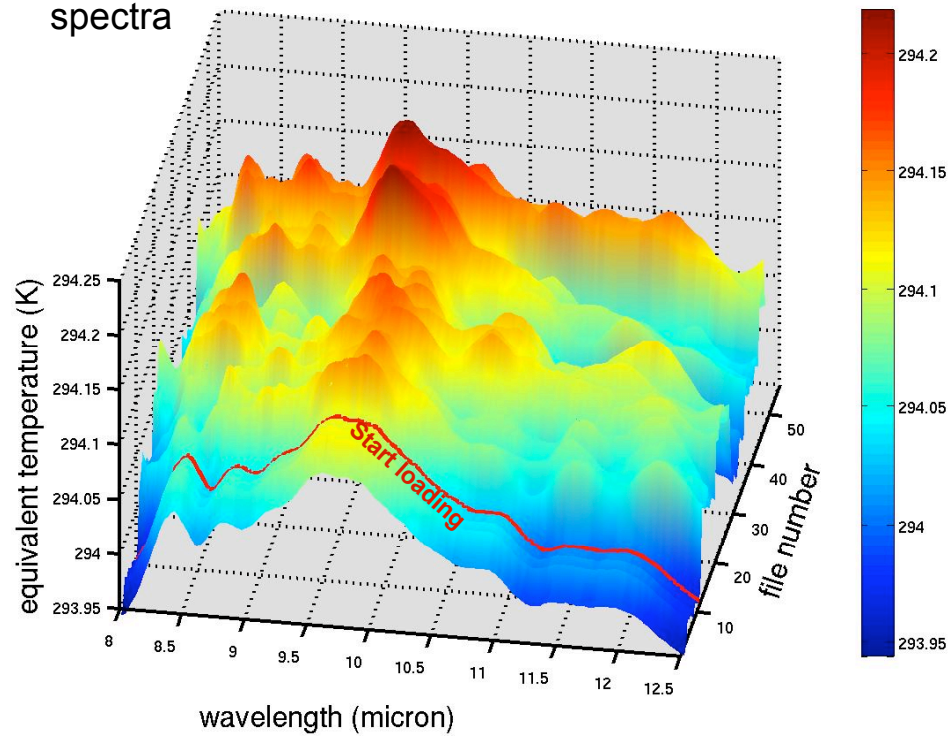
Jan 22, 2001





Pre-loading and
loading
spectra

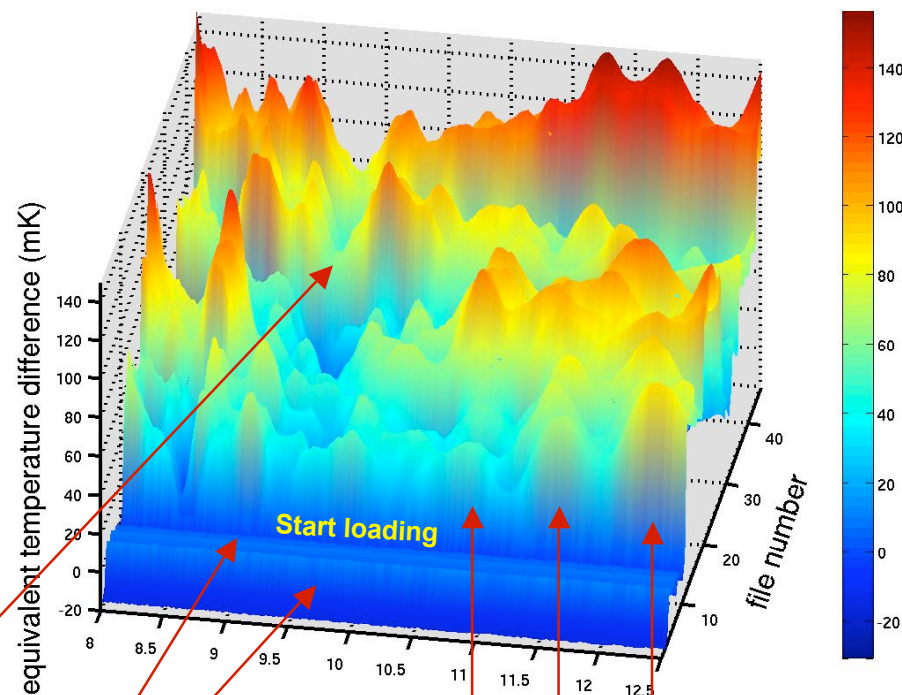
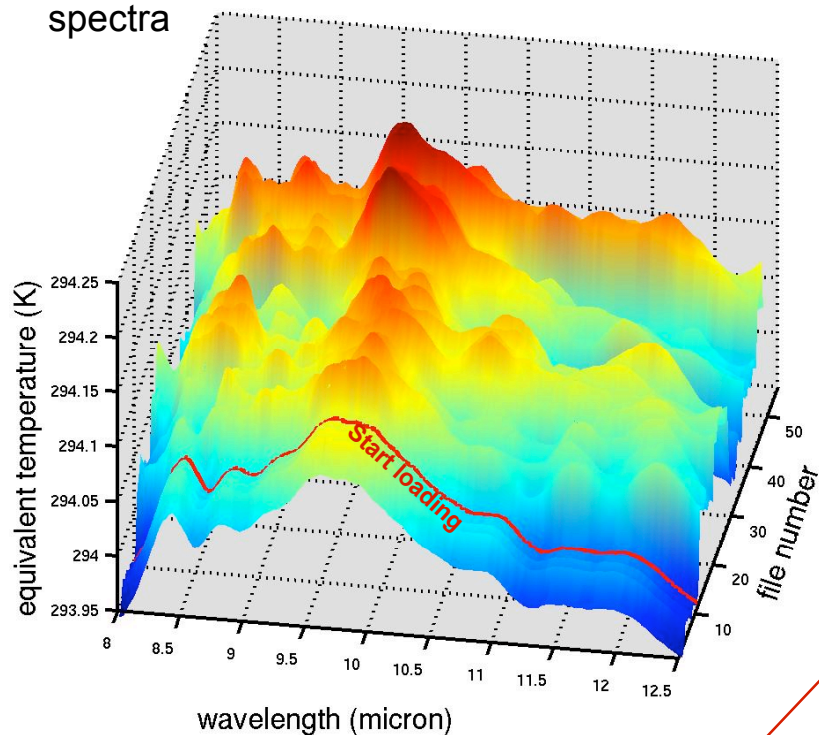
Anorthosite Run #12



Pre-loading and
loading
spectra

Anorthosite Run #12

Difference spectra

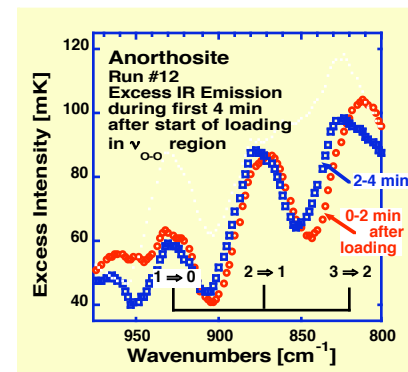


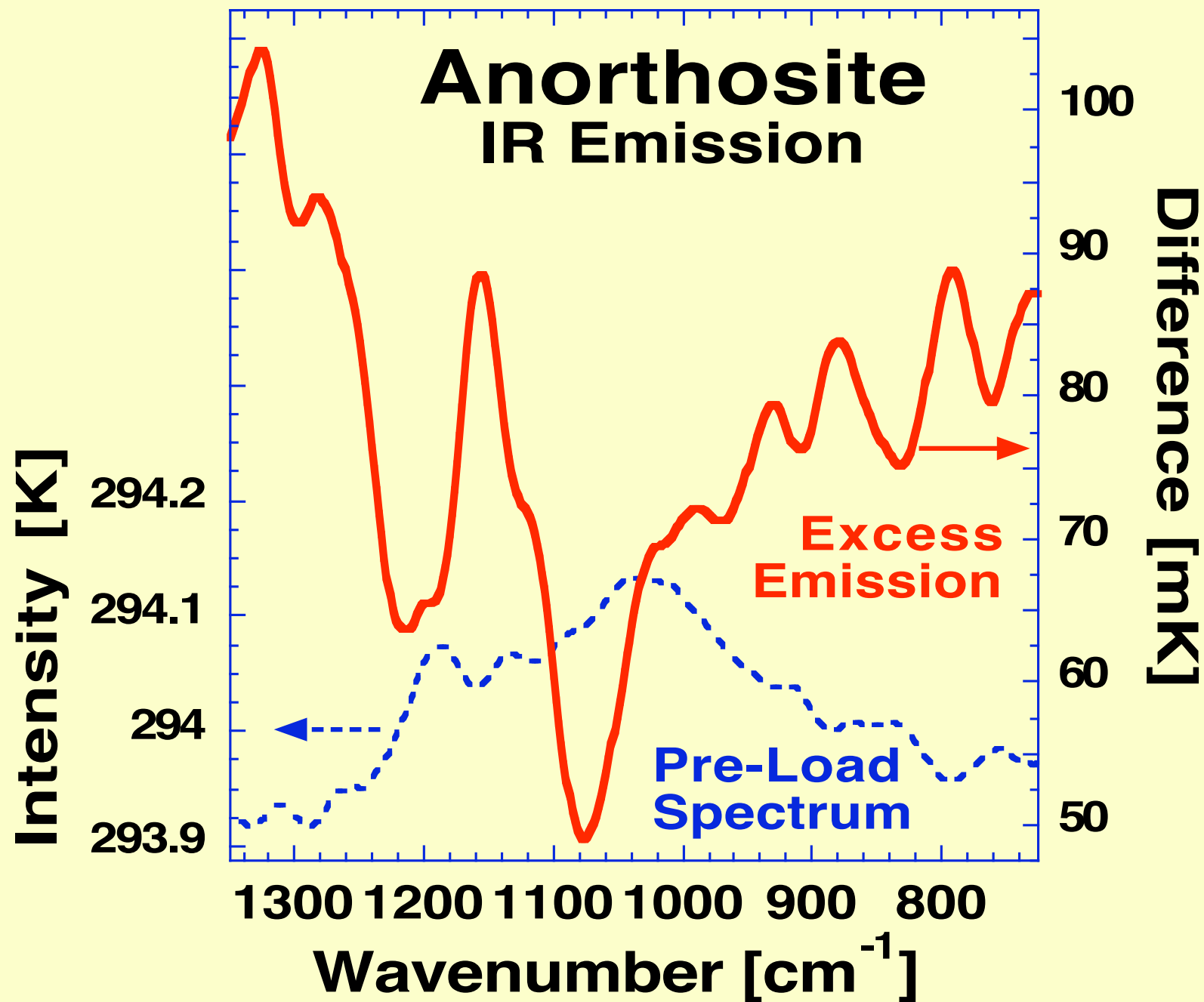
Secondary Si-O and
Al-O bands?

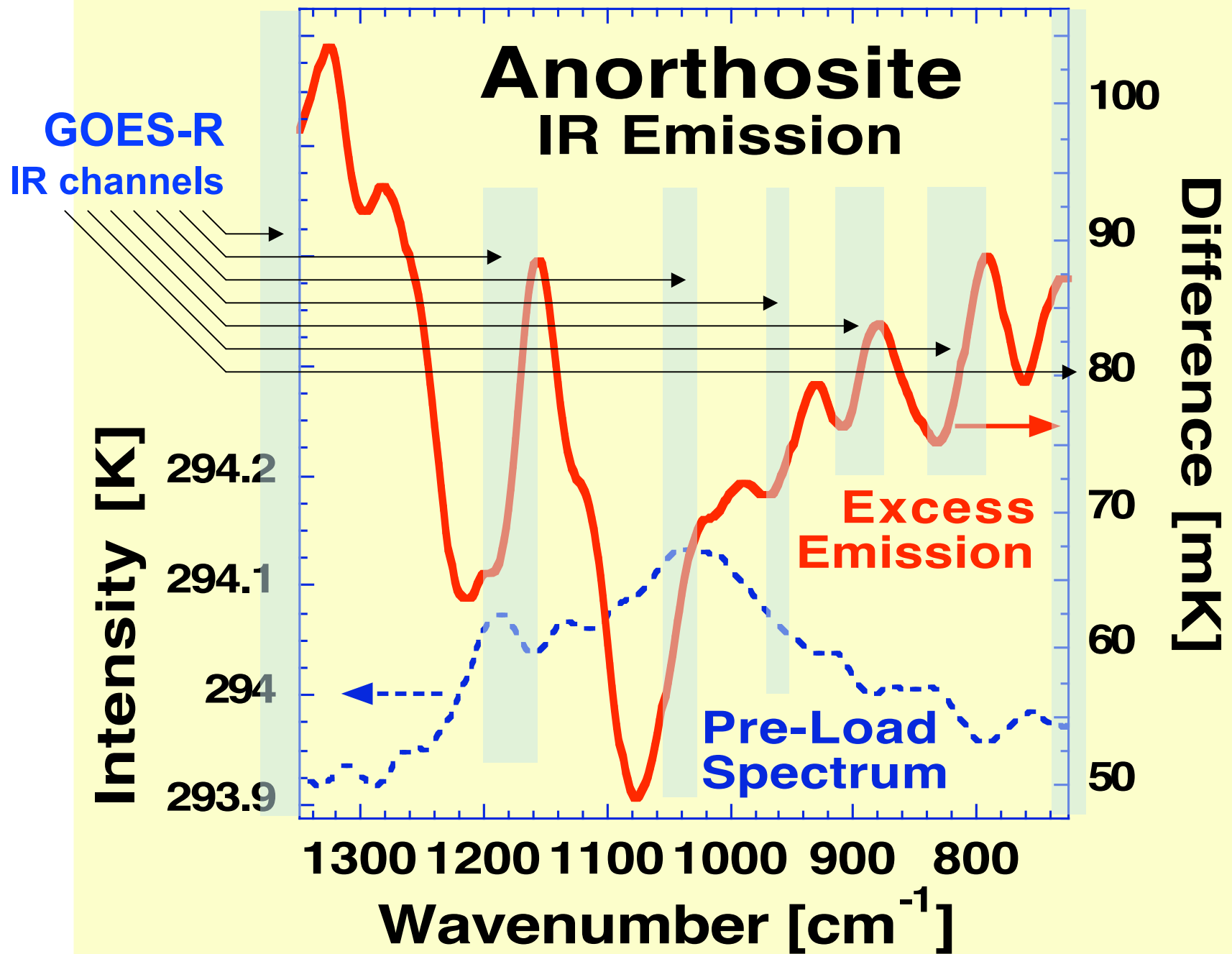
O-O combination bands
with lattice modes?

Primary O-O hot bands
plus O-O fundamental?

narrow bands







Conclusions:

We start to understand the physics

We can design protocols for measuring
(and re-evaluating) many processes
that are linked to or influenced by
the electronic charge carriers activated
deep in the Earth's crust.

**Piston
contacts**

**Capacitive
sensor**

**Edge
contact**

